General

Title

Overuse of imaging: percentage of children, ages 2 through 17 years old, with post-traumatic headache who were evaluated in the ED within 24 hours after an injury, and imaging of the head (CT or MRI) was obtained in the absence of documented neurologic signs or symptoms that suggest intracranial hemorrhage or basilar skull fracture.

Source(s)

Quality Measurement, Evaluation, Testing, Review and Implementation Consortium (Q-METRIC). Basic measure information: overuse of imaging for the evaluation of children with post-traumatic headache. Ann Arbor (MI): Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC); 2016 Jan. 47 p.

Measure Domain

Primary Measure Domain

Clinical Quality Measures: Process

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure is used to assess the percentage of children, ages 2 through 17 years old, with post-traumatic headache who were evaluated in the emergency department (ED) within 24 hours after an injury, and imaging of the head (computed tomography [CT] or magnetic resonance imaging [MRI]) was obtained in the absence of documented neurologic signs or symptoms that suggest intracranial hemorrhage or basilar skull fracture.

A lower percentage indicates better performance, as reflected by use of imaging only when indicated.

Rationale

Post-traumatic headaches in children are a common clinical presentation in the setting of concussion and mild traumatic brain injury. In the United States, it has been estimated that more than 500,000 children younger than 15 years of age were evaluated in an emergency department (ED) following mild traumatic brain injury each year from 1998 to 2000 (Bazarian et al., 2005). Over the past decade, ED visits for traumatic brain injuries have increased substantially (Coronado et al., 2015).

Well-established evidence shows that neuroimaging to evaluate children with post-traumatic headache in the absence of documented neurologic signs or symptoms that suggest intracranial hemorrhage or skull fracture is rarely clinically indicated and is potentially harmful (Kuppermann et al., 2009; Lateef et al., 2009; Lateef et al., 2012; Ryan et al., 2014). The American Academy of Pediatrics (AAP) (2013) Choosing Wisely initiative includes guidance to discourage the unnecessary use of computed tomography (CT) scans for the immediate evaluation of minor head injuries and encourage reliance on clinical observation and criteria established by the Pediatric Emergency Care Applied Research Network (PECARN) to determine whether imaging is indicated (Kuppermann et al., 2009).

CT use has increased in the past 20 years. In a cross-sectional analysis of data from the National Hospital Ambulatory Medical Care Survey, Blackwell et al. (2007) found the use of CT scans for the evaluation of children with head injury nearly doubled from 1995 to 2003 (13% to 22%); Zonfrillo et al. (2015) found evidence to suggest continued increases in CT use for ED patients with concussion from 2006 to 2011. Some research suggests that rates of imaging following head injury appear to have declined in free-standing children's hospitals (Menoch et al., 2012; Mannix et al., 2012; Parker et al., 2015) and general EDs (Marin et al., 2014). Also, CT rates for children with mild head trauma vary widely between hospitals. CT rates ranged from 19% to 69% across 25 EDs (Stanley et al., 2014). Similarly, CT rates ranged from 19% to 58% for patients with minor head injury in a retrospective analysis of 5 years of hospital administrative data from 40 free-standing children's hospitals (Mannix et al., 2012).

Overuse has been defined as any patient who undergoes a procedure or test for an inappropriate indication (Lawson et al., 2012). Imaging overuse for the evaluation of children with post-traumatic headaches without signs or symptoms of intracranial injury subjects children to a number of risks (Malviya et al., 2000; Mathews et al., 2013; Pearce et al., 2012; Wachtel, Dexter, & Dow, 2009). Individuals who undergo CT scans in early childhood tend to be at greater risk for developing leukemia, primary brain tumors, and other malignancies later in life (Mathews et al., 2013; Pearce et al., 2012). Children are also at risk for complications from sedation or anesthesia, which are often required for longer CT imaging sequences and for magnetic resonance imaging (MRI), and from intravenous contrast media (Zo'o et al., 2011). Cost is also an issue (Callaghan et al., 2014) that burdens the patient, as well as payers.

Evidence for Rationale

American Academy of Pediatrics (AAP). Choosing Wisely: An initiative of the ABIM Foundation. Ten things physicians and patients should question. [internet]. Philadelphia (PA): American Academy of Pediatrics (AAP); 2013 Feb 21 [accessed 2015 Feb 24].

Bazarian JJ, McClung J, Shah MN, Cheng YT, Flesher W, Kraus J. Mild traumatic brain injury in the United States, 1998--2000. Brain Inj. 2005 Feb;19(2):85-91. PubMed

Blackwell CD, Gorelick M, Holmes JF, Bandyopadhyay S, Kuppermann N. Pediatric head trauma: changes in use of computed tomography in emergency departments in the United States over time. Ann Emerg Med. 2007 Mar;49(3):320-4. PubMed

Callaghan BC, Kerber KA, Pace RJ, Skolarus LE, Burke JF. Headaches and neuroimaging: high utilization and costs despite guidelines. JAMA Intern Med. 2014 May;174(5):819-21. PubMed

Coronado VG, Haileyesus T, Cheng TA, Bell JM, Haarbauer-Krupa J, Lionbarger MR, Flores-Herrera J, McGuire LC, Gilchrist J. Trends in Sports- and Recreation-Related Traumatic Brain Injuries Treated in US

Emergency Departments: The National Electronic Injury Surveillance System-All Injury Program (NEISS-AIP) 2001-2012. J Head Trauma Rehabil. 2015 May-Jun;30(3):185-97. PubMed

Kuppermann N, Holmes JF, Dayan PS, Hoyle JD, Atabaki SM, Holubkov R, Nadel FM, Monroe D, Stanley RM, Borgialli DA, Badawy MK, Schunk JE, Quayle KS, Mahajan P, Lichenstein R, Lillis KA, Tunik MG, Jacobs ES, Callahan JM, Gorelick MH, Glass TF, Lee LK, Bachman MC, Cooper A, Powell EC, Gerardi MJ, Melville KA, Muizelaar JP, Wisner DH, Zuspan SJ, Dean JM, Wootton-Gorges SL, Pediatric Emergency Care Applied Research Network (PECARN). Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. Lancet. 2009 Oct 3;374(9696):1160-70. PubMed

Lateef TM, Grewal M, McClintock W, Chamberlain J, Kaulas H, Nelson KB. Headache in young children in the emergency department: use of computed tomography. Pediatrics. 2009 Jul;124(1):e12-7. PubMed

Lateef TM, Kriss R, Carpenter K, Nelson KB. Neurologic complaints in young children in the ED: when is cranial computed tomography helpful?. Am J Emerg Med. 2012 Oct;30(8):1507-14. PubMed

Lawson EH, Gibbons MM, Ko CY, Shekelle PG. The appropriateness method has acceptable reliability and validity for assessing overuse and underuse of surgical procedures. J Clin Epidemiol. 2012 Nov;65(11):1133-43. PubMed

Malviya S, Voepel-Lewis T, Eldevik OP, Rockwell DT, Wong JH, Tait AR. Sedation and general anaesthesia in children undergoing MRI and CT: adverse events and outcomes. Br J Anaesth. 2000 Jun;84(6):743-8. PubMed

Mannix R, Meehan WP, Monuteaux MC, Bachur RG. Computed tomography for minor head injury: variation and trends in major United States pediatric emergency departments. J Pediatr. 2012 Jan;160(1):136-9.e1. PubMed

Marin JR, Weaver MD, Barnato AE, Yabes JG, Yealy DM, Roberts MS. Variation in emergency department head computed tomography use for pediatric head trauma. Acad Emerg Med. 2014 Sep;21(9):987-95. PubMed

Mathews JD, Forsythe AV, Brady Z, Butler MW, Goergen SK, Byrnes GB, Giles GG, Wallace AB, Anderson PR, Guiver TA, McGale P, Cain TM, Dowty JG, Bickerstaffe AC, Darby SC. Cancer risk in 680,000 people exposed to computed tomography scans in childhood or adolescence: data linkage study of 11 million Australians. BMJ. 2013;346:f2360. PubMed

Menoch MJ, Hirsh DA, Khan NS, Simon HK, Sturm JJ. Trends in computed tomography utilization in the pediatric emergency department. Pediatrics. 2012 Mar;129(3):e690-7. PubMed

Parker MW, Shah SS, Hall M, Fieldston ES, Coley BD, Morse RB. Computed tomography and shifts to alternate imaging modalities in hospitalized children. Pediatrics. 2015 Sep;136(3):e573-81. PubMed

Pearce MS, Salotti JA, Little MP, McHugh K, Lee C, Kim KP, Howe NL, Ronckers CM, Rajaraman P, Sir Craft AW, Parker L, Berrington de GonzÃilez A. Radiation exposure from CT scans in childhood and subsequent risk of leukaemia and brain tumours: a retrospective cohort study. Lancet. 2012 Aug 4;380(9840):499-505. PubMed

Quality Measurement, Evaluation, Testing, Review and Implementation Consortium (Q-METRIC). Basic measure information: overuse of imaging for the evaluation of children with post-traumatic headache. Ann Arbor (MI): Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC); 2016 Jan. 47 p.

Ryan ME, Palasis S, Saigal G, Singer AD, Karmazyn B, Dempsey ME, Dillman JR, Dory CE, Garber M,

Hayes LL, Iyer RS, Mazzola CA, Raske ME, Rice HE, Rigsby CK, Sierzenski PR, Strouse PJ, Westra SJ, Wootton-Gorges SL, Coley BD, Expert Panel on Pediatric Imaging. ACR Appropriateness CriteriaÂ® head trauma -- child [online publication]. Reston (VA): American College of Radiology (ACR); 2014. 14 p. [68 references]

Stanley RM, Hoyle JD, Dayan PS, Atabaki S, Lee L, Lillis K, Gorelick MH, Holubkov R, Miskin M, Holmes JF, Dean JM, Kuppermann N, Pediatric Emergency Care Applied Research Network (PECARN). Emergency department practice variation in computed tomography use for children with minor blunt head trauma. J Pediatr. 2014 Dec;165(6):1201-1206.e2. PubMed

Wachtel RE, Dexter F, Dow AJ. Growth rates in pediatric diagnostic imaging and sedation. Anesth Analg. 2009 May;108(5):1616-21. PubMed

Zonfrillo MR, Kim KH, Arbogast KB. Emergency department visits and head computed tomography utilization for concussion patients from 2006 to 2011. Acad Emerg Med. 2015 Jul;22(7):872-7. PubMed

Zo'o M, Hoermann M, Balassy C, Brunelle F, Azoulay R, Pariente D, Panuel M, Le Dosseur P. Renal safety in pediatric imaging: randomized, double-blind phase IV clinical trial of iobitridol 300 versus iodixanol 270 in multidetector CT. Pediatr Radiol. 2011 Nov;41(11):1393-400. PubMed

Primary Health Components

Brain injury; post-traumatic headache; computed tomography (CT); magnetic resonance imaging (MRI); overuse; children

Denominator Description

The number of children, ages 2 through 17 years old, with post-traumatic headache who were evaluated in the emergency department (ED) within 24 hours after an injury, and imaging of the head (computed tomography [CT] or magnetic resonance imaging [MRI]) was obtained in the absence of suspected child abuse and neglect or a history of a medical condition that would otherwise warrant neuroimaging. See the related "Denominator Inclusions/Exclusions" field.

Numerator Description

The number of numerator eligible children, ages 2 through 17 years old, with post-traumatic headache who were evaluated in the emergency department (ED) within 24 hours after an injury, and imaging of the head (computed tomography [CT] or magnetic resonance imaging [MRI]) was obtained in the absence of documented neurologic signs or symptoms that suggest intracranial hemorrhage or basilar skull fracture. See the related "Numerator Inclusions/Exclusions" field.

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

A clinical practice guideline or other peer-reviewed synthesis of the clinical research evidence

A formal consensus procedure, involving experts in relevant clinical, methodological, public health and organizational sciences

A systematic review of the clinical research literature (e.g., Cochrane Review)

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed

journal

Additional Information Supporting Need for the Measure

Summary of Disparities Data from the Literature

In a cross-sectional study of 50,835 pediatric emergency visits for head injury captured in the National Hospital Ambulatory Medical Care Survey 2002 to 2006, white race was associated with higher odds of neuroimaging (odds ratio [OR] 1.5, 95% confidence interval [CI]: 1.02-2.1) (Mannix et al., 2010). Natale and colleagues (2012) conducted a secondary analysis of data prospectively collected for the PECARN head imaging decision rule (Kuppermann et al., 2009) to test for associations between race/ethnicity and the ordering of CT among children with blunt head injury. They found that children of black non-Hispanic or Hispanic race/ethnicity had lower odds of undergoing head CT than white non-Hispanic children. Parental anxiety and parental request were cited as reasons for ordering head CT in children of white, non-Hispanic race/ethnicity. Their findings suggest that overuse of CT imaging may disproportionately affect white, non-Hispanic children. Similarly, Morrison and colleagues (2015) found that minority race was associated with less radiologic testing in the children of parents with low health literacy in a cross-sectional study of 504 caregivers accompanying their child to a pediatric ED. When associated with race/ethnicity, overuse of health care, in general, is greater among white patients (Kressin & Groeneveld, 2015).

See the original measure documentation for additional evidence supporting the measure.

Evidence for Additional Information Supporting Need for the Measure

Kressin NR, Groeneveld PW. Race/ethnicity and overuse of care: a systematic review. Milbank Q. 2015 Mar;93(1):112-38. PubMed

Kuppermann N, Holmes JF, Dayan PS, Hoyle JD, Atabaki SM, Holubkov R, Nadel FM, Monroe D, Stanley RM, Borgialli DA, Badawy MK, Schunk JE, Quayle KS, Mahajan P, Lichenstein R, Lillis KA, Tunik MG, Jacobs ES, Callahan JM, Gorelick MH, Glass TF, Lee LK, Bachman MC, Cooper A, Powell EC, Gerardi MJ, Melville KA, Muizelaar JP, Wisner DH, Zuspan SJ, Dean JM, Wootton-Gorges SL, Pediatric Emergency Care Applied Research Network (PECARN). Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. Lancet. 2009 Oct 3;374(9696):1160-70. PubMed

Mannix R, Bourgeois FT, Schutzman SA, Bernstein A, Lee LK. Neuroimaging for pediatric head trauma: do patient and hospital characteristics influence who gets imaged?. Acad Emerg Med. 2010 Jul;17(7):694-700. PubMed

Morrison AK, Brousseau DC, Brazauskas R, Levas MN. Health literacy affects likelihood of radiology testing in the pediatric emergency department. J Pediatr. 2015 Apr;166(4):1037-41.e1. PubMed

Natale JE, Joseph JG, Rogers AJ, Mahajan P, Cooper A, Wisner DH, Miskin ML, Hoyle JD, Atabaki SM, Dayan PS, Holmes JF, Kuppermann N, PECARN (Pediatric Emergency Care Applied Research Network). Cranial computed tomography use among children with minor blunt head trauma: association with race/ethnicity. Arch Pediatr Adolesc Med. 2012 Aug;166(8):732-7. PubMed

Quality Measurement, Evaluation, Testing, Review and Implementation Consortium (Q-METRIC). Basic measure information: overuse of imaging for the evaluation of children with post-traumatic headache. Ann Arbor (MI): Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC); 2016 Jan. 47 p.

Extent of Measure Testing

Data/Sample Used for All Testing of this Measure

Type of Data Used for Testing (N= Numerator; D= Denominator). Measure is specified to use data from:

Abstracted from paper record – N and D
Administrative claims – D only
Abstracted from electronic health record – N and D

Measure is tested with data from:

Abstracted from paper record – N and D
Administrative claims – D only
Abstracted from electronic health record – N and D

Dataset Used. Data used for testing were obtained from HealthCore, Inc., an independent subsidiary of Anthem, Inc., which is the largest health benefits company/insurer in the United States. HealthCore owns and operates the HealthCore Integrated Research Database (HIRD), a longitudinal database of medical and pharmacy claims and enrollment information.

Dates of the Data Used in Testing. January 1, 2011 through December 31, 2012

Levels of Analysis Tested.

Level of aggregation specified: health plan
Level of aggregation tested: health plan

Measured Entities Included in Testing and Analysis. This measure was tested using data contained in the HIRD. The HIRD includes automated computerized claims data and enrollment information for members from 14 geographically diverse Blue Cross and/or Blue Shield (BCBS) health plans in the Northeast, South, West, and Central regions of the United States, with members living in all 50 states. The HIRD represents data from approximately 60 million lives with medical enrollment, over 37 million lives with combined medical and pharmacy enrollment information, and 16 million lives with outpatient laboratory data.

Patients Included in Testing and Analysis. This measure belongs to the Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC) *Overuse of Imaging for the Evaluation of Children with Headache or Seizures* measures collection. As part of the initial sampling strategy for testing multiple measures in this collection, approximately 2.1 million children, ages 6 months through 17 years old, were identified in the HIRD for the study's 2012 measurement year. Of these, a cohort of children with diagnosis codes for headaches and seizures were identified (57,748). Members who did not have continuous eligibility during the 2011 and 2012 calendar years were excluded, narrowing the group to 36,985 (64.0%).

Specifically for this measure, administrative claims were used to identify children, ages 2 through 17 years old, who had International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes that indicated a post-traumatic headache, concussion, or general symptoms of headache evaluated in the emergency department (ED; 5,912, 16.0%). From this group, 2,967 children (50.2%) were identified as having either CT or MR imaging. After applying claims-based exclusions (suspected abuse and neglect, history of a medical condition that could warrant neuroimaging, loss of consciousness, skull fracture, and intracranial hemorrhage), 2,419 children (81.5%) were eligible to sample for chart review.

Once the population eligible for chart review was determined using administrative claims, providers associated with visits were identified. The final sampling population for chart review consisted of 1,714 children (70.9%) who could be linked to a provider having complete contact information. In an attempt to obtain an adequate number of cases to test this measure, we set a target sample of 200 abstracted charts. Patient medical records were then requested from provider offices and health care facilities for data abstraction. Patient medical records were sent to a centralized location for data abstraction. The first 204 charts received were abstracted for measure testing; 86 children (42.2%) were female, and the

average age was 12.0 (SD = 3.9).

Of the 204 abstracted charts, one (0.5%) was excluded based on clinical documentation of suspected child abuse or neglect and five (2.5%) were excluded due to documentation of a medical condition that could otherwise warrant neuroimaging. There were 65 charts (31.9%) with clinical documentation of trauma occurring within 24 hours of the ED visit; among those, eight were excluded, as they had concussion as a diagnosis without evidence of a headache as a symptom, leaving 57 charts (27.9%) in the eligible study population.

Method and Steps of Validity Testing

Validity of Data Abstraction from the Medical Record. Validity of medical record data was determined through re-abstraction of patient record data by a senior abstractor, considered the gold standard for medical record review. The inter-rater reliability (IRR) was calculated comparing abstractors with the senior abstractor. IRR was determined by calculating percent agreement and Cohen's kappa statistic. Sensitivity, specificity, and negative and positive predictive values were calculated.

Face Validity of Performance Measure Score. The face validity of this measure was established by a national panel of experts and parent representatives for families of children with headache and seizures convened by Q-METRIC. The Q-METRIC panel included nationally recognized experts in the area of imaging children, representing general pediatrics, pediatric radiology, pediatric neurology, pediatric neurosurgery, pediatric emergency medicine, general emergency medicine, and family medicine. In addition, measure validity was considered by experts in state Medicaid program operations, health plan quality measurement, health informatics, and health care quality measurement. In total, the Q-METRIC imaging panel included 15 experts, providing a comprehensive perspective on imaging children and the measurement of quality metrics for states, health plans, and emergency departments (EDs). The expert panel assessed whether the performance of this measure would result in improved quality of care for children with headache and seizures in relation to neuroimaging. Specifically, the panel weighed the evidence to determine if this measure of overuse could reduce unnecessary imaging among children with post-traumatic headache. The voting process to prioritize the measure was based on the ability of the measure to distinguish good from poor quality.

Statistical Results from Validity Testing

Validity of Data Abstraction from the Medical Record. Of the 204 abstracted medical records, 30 (15%) were reviewed for IRR; percent agreement and kappa were calculated. IRR was assessed by comparing individual abstractor agreement with a senior abstractor as the gold standard on the 16 data elements abstracted from charts for this measure (corresponding to 441 eligible items after accounting for skip patterns). Disagreement was identified for two of the 16 data elements: 1) Was there documentation of increased intracranial pressure? (Indications include: swelling of the optic disc [papilledema], double vision [diplopia]) abnormal face or eye movements, dizziness [vertigo], abnormal gait [ataxia], abnormal coordination [dysmetria], confusion); percent agreement was 96.7% (kappa 0.84). 2) Was there documentation of altered mental status including comments such as "not acting like himself" per parent report?; percent agreement was 96.7% (kappa 0.90).

Overall, abstractor agreement was 99.3% (kappa 0.98). The sensitivity of the abstractors to identify chart-based exclusions compared with the senior abstractor was 100% (95% confidence interval [CI]; 94.6, 100); specificity was 99.5% (95% CI; 98.1, 99.9); positive predictive value was 97.1% (95% CI; 89.9, 99.7) and negative predictive value was 100% (95% CI; 99.0, 100.0). Refer to the related contingency table (Table 7) in the original measure documentation.

Face Validity of Performance Measure Score. The Q-METRIC expert panel concluded that this measure has a high degree of face validity through a detailed review of concepts and metrics considered to be essential to the appropriate imaging of children. Concepts and draft measures were rated by this group for their relative importance. This measure was highly rated, receiving an average score of 7.0 (with 9 as the highest possible score). In addition, the expert panel concluded that this measure of overuse of neuroimaging for the evaluation of children with post-traumatic headache could reduce unnecessary imaging for this population of children, and the measure would be able to distinguish good from poor quality.

Refer to the original measure documentation for additional information.

Evidence for Extent of Measure Testing

Quality Measurement, Evaluation, Testing, Review and Implementation Consortium (Q-METRIC). Basic measure information: overuse of imaging for the evaluation of children with post-traumatic headache. Ann Arbor (MI): Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC); 2016 Jan. 47 p.

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Emergency Department

Hospital Outpatient

Managed Care Plans

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

Statement of Acceptable Minimum Sample Size

Specified

Target Population Age

Age 2 to 17 years

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Aim

Better Care

National Quality Strategy Priority

Making Care Safer
Prevention and Treatment of Leading Causes of Mortality

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Safety

Data Collection for the Measure

Case Finding Period

The measurement year

Denominator Sampling Frame

Enrollees or beneficiaries

Denominator (Index) Event or Characteristic

Clinical Condition

Diagnostic Evaluation

Encounter

Patient/Individual (Consumer) Characteristic

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions

The number of children, ages 2 through 17 years old, with post-traumatic headache who were evaluated in the emergency department (ED) within 24 hours after an injury, and imaging of the head (computed tomography [CT] or magnetic resonance imaging [MRI]) was obtained in the absence of suspected child abuse and neglect or a history of a medical condition that would otherwise warrant neuroimaging.

Note:

> Eligible children must be ages 2 through 17 years old during the measurement year for which imaging of the head is obtained and must be continuously enrolled in their insurance plan during both the measurement year and the year prior. Eligible children must also receive head imaging in association with an ED visit for post-traumatic headache within 24 hours of the time of injury.
> Refer to the original measure documentation for administrative codes. International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) to International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) code conversions are presented in the Tables where appropriate.

Exclusions

- Exclusions based on ICD-9-CM codes captured in administrative claims data:
  - Suspected abuse/neglect
    - Based on relevant ICD-9-CM codes (refer to Table 4 of the original measure documentation) associated with health care received on the day of or within 7 days prior to neuroimaging
  - Medical history that could otherwise warrant neuroimaging
    - Based on ICD-9-CM codes (refer to Table 5 of the original measure documentation) associated with health care received on the day of or within the 365 days before the imaging was obtained
- Exclusions based on clinical documentation:
  - Suspected abuse/neglect noted during the ED visit during which neuroimaging was obtained
  - Medical history noted during the ED visit during which neuroimaging was obtained that could otherwise warrant imaging (e.g., neoplasm and blood disorder, hydrocephalus and central nervous system [CNS] anomalies, tuberous sclerosis, dwarfism, hemangioma, phlebitis/thrombophlebitis, intracranial hemorrhage, occlusion of cerebral arteries, moyamoya disease, congenital heart disease, anticoagulation)
  - No clinical documentation of headache as a symptom in cases where inclusion was based only on an ICD-9-CM code for concussion (refer to the original measure documentation)
  - No clinical documentation of trauma history in cases where inclusion was based only on an ICD-9-CM code for headache (refer to the original measure documentation)
  - Time of the injury was not documented in the medical record
  - Time of the injury was documented to be greater than 24 hours prior to the time of the ED visit

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions

The number of numerator eligible children, ages 2 through 17 years old, with post-traumatic headache who were evaluated in the emergency department (ED) within 24 hours after an injury, and imaging of the head (computed tomography [CT] or magnetic resonance imaging [MRI]) was obtained in the absence of documented neurologic signs or symptoms that suggest intracranial hemorrhage or basilar skull fracture.

Exclusions

- Severe mechanism of injury (e.g., penetrating trauma, fall from more than 5 feet, pedestrian struck by vehicle)
- History of seizure or convulsions associated with trauma
- History of loss of consciousness associated with trauma
- Repeated vomiting
- Documented basilar skull fracture
- Suspected basilar skull fracture based on the following examination findings:
  - "Raccoon eyes" (bruising around the eyes/black eyes), Battle's sign (bruising behind one or both ears), hemotympanum (blood behind one or both ear drums)
- Absence of documented neurologic examination
- Abnormal neurologic examination or signs or symptoms of intracranial hemorrhage or increased intracranial pressure:
  - Decreased alertness or confusion, including comments such as "not acting like himself" per parent report
  - Altered mental status or Glasgow Coma Scale Score less than 14
  - Papilledema
  - Diplopia
  - Abnormal face or eye movements
  - Asymmetric face or extremity muscle movements
  - Altered sensation
  - Dizziness
  - Gait disturbance
  - Lack of coordination

Numerator Search Strategy

Fixed time period or point in time

Data Source

Administrative clinical data

Electronic health/medical record

Paper medical record

Type of Health State

Does not apply to this measure

Instruments Used and/or Associated with the Measure

Chart Abstraction Tool: Overuse of Imaging for the Evaluation of Children with Post-Traumatic Headache

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Rate/Proportion

Interpretation of Score

Desired value is a lower score

Allowance for Patient or Population Factors

not defined yet

Standard of Comparison

not defined yet

Identifying Information

Original Title

Overuse of imaging for the evaluation of children with post-traumatic headache.

Measure Collection Name

Overuse of Imaging for the Evaluation of Children with Headache or Seizures

Submitter

Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC) - Academic Affiliated Research Institute

Developer

Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC) - Academic Affiliated Research Institute

Funding Source(s)

This work was funded by the Agency for Healthcare Research and Quality (AHRQ) and the Centers for Medicare & Medicaid Services (CMS) under the Children's Health Insurance Program Reauthorization Act (CHIPRA) Pediatric Quality Measures Program Centers of Excellence grant number U18 HS020516.

Composition of the Group that Developed the Measure

Overuse of Imaging Expert Panels

Representative Panel

Dana Cook, Parent Representative, Paw Paw, MI

Peter Dayan, MD, MSc, Division of Pediatric Emergency Medicine, Morgan Stanley Children's Hospital, New York, NY
Lisa Dover, Parent Representative, Ann Arbor, MI
Danny Greig, MD, FAAFP, Emergency Room Physician, MidMichigan Medical Center, Midland, MI
Blaise Jones, MD, Director of Clinical Services, Chief of Neuroradiology, Cincinnati Children's Hospital Medical Center, Cincinnati, OH
Steven Leber, MD, PhD, Professor of Pediatrics and Neurology, University of Michigan, Ann Arbor, MI
Cormac Maher, MD, Associate Professor of Neurosurgery, University of Michigan, Ann Arbor, MI
L. Kendall Webb, MD, Assistant Professor of Emergency Medicine, Director of IT for the Emergency Department, University of Florida, Jacksonville, Jacksonville, FL
Neal Weinberg, MD, FAAP, General Pediatrician, IHA Pediatric Healthcare – Arbor Park, Ann Arbor, MI

Feasibility Panel

Cathy Call, RN, BSN, MSEd, MSN, CPHQ, PMP, LSS, Practice Area Leader for Health Quality Research, Health Care Analytics Group, Altarum Institute, Alexandria, VA
Andrea DeVries, PhD, Director of Research Operations, HealthCore Inc., Wilmington, DE
J. Mitchell Harris, PhD, Director of Research and Statistics, Children's Hospital Association, (formerly NACHRI), Alexandria, VA
Don Lighter, MD, MBA, Director, The Institute for Health Quality Research and Education, Knoxville, TN
Sue Moran, BSN, MPH, Director of the Bureau of Medicaid Program Operations and Quality Assurance, Michigan Department of Community Health, Lansing, MI
Stuart Weinberg, MD, Assistant Professor of Biomedical Informatics, Assistant Professor of Pediatrics, Vanderbilt University, Nashville, TN

Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC) Investigators

Michelle L. Macy, MD, MS, Assistant Professor, Departments of Emergency Medicine and Pediatrics, School of Medicine, University of Michigan, Ann Arbor, MI
Gary L. Freed, MD, MPH, Professor of Pediatrics, School of Medicine and Professor of Health Management and Policy, School of Public Health, University of Michigan, Ann Arbor, MI (principal investigator)
Kevin J. Dombkowski, DrPH, MS, Research Associate Professor of Pediatrics, School of Medicine, University of Michigan, Ann Arbor, MI

Financial Disclosures/Other Potential Conflicts of Interest

Unspecified

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2016 Jan

Measure Maintenance

Unspecified

Date of Next Anticipated Revision

Unspecified

Measure Status

This is the current release of the measure.

Measure Availability

Source available from the Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC) Web site. Support documents also available from the Q-METRIC Web site.

For more information, contact Q-METRIC at 300 North Ingalls Street, Room 6C08, SPC 5456, Ann Arbor, MI 48109-5456; Phone: 734-232-0657.

NQMC Status

This NQMC summary was completed by ECRI Institute on May 9, 2016. The information was verified by the measure developer on June 29, 2016.

Copyright Statement

Production

Source(s)

Quality Measurement, Evaluation, Testing, Review and Implementation Consortium (Q-METRIC). Basic measure information: overuse of imaging for the evaluation of children with post-traumatic headache. Ann Arbor (MI): Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC); 2016 Jan. 47 p.

Disclaimer

NQMC Disclaimer

Measures represented on the NQMC Web site are submitted by measure developers, and are screened solely to determine that they meet the NQMC Inclusion Criteria.

NQMC, AHRQ, and its contractor ECRI Institute make no warranties concerning the content or its reliability and/or validity of the quality measures and related materials represented on this site. Moreover, the views and opinions of developers or authors of measures represented on this site do not necessarily state or reflect those of NQMC, AHRQ, or its contractor, ECRI Institute, and inclusion or hosting of measures in NQMC may not be used for advertising or commercial endorsement purposes.

Readers with questions regarding measure content are directed to contact the measure developer.